

Primary Journal Selection Using Citations from an Indexing Service Journal:

A Method and Example from Nursing Literature

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ABSTRACT

Although serial literature is extremely important to a library collection, it is also the source of many problems. Specialty journal selection is difficult, particularly for the librarian of a small or intermediate-size library that is not in a position to develop or maintain an exhaustive or inclusive collection in a particular field or discipline. Steadily increasing journal costs and recent economic trends necessitate establishment or reexamination of a periodical collection policy.

In this investigation, the technique used analyzes citations assigned to medical subject headings (*MeSH*) and subheadings by indexers who prepare the MEDLARS data base. Citations have been retrieved by exploiting the on-line nature of the MEDLARS data base. A four-year time period is used to identify specialty journals in the area of nursing.

Results given include a separate rank-order listing arranged by decreasing frequency of productivity for each *MeSH* term searched. A composite listing is given for the 16,355 unique citations retrieved. The approach illustrated and data presented may be useful in establishing library policy for questions of periodical subscription and setting of priorities for binding and microform purchases. The purpose of the approach described is to predict collection demand with efficiency and economy.

THE key role played by journal literature for the medical profession and the health science library is well known and accepted. In 1884, Leartus Connor, in an address before the American Association of Medical Editors, said that the medical journal, although greatly influenced by the medical men among whom it circulates, is unquestionably "the greatest factor of modern medical progress" [1]. In 1924, William J. Mayo observed: "The profession as a whole is keeping abreast of the times by means of medical journals, and these periodicals must be recognized as the greatest force in medical education" [2]. In 1943, Bertha Hallam wrote: "A well-rounded medical library must consist in major part of periodical material,

including journals and serials of many types After periodical literature, monographs and textbooks on special subjects are a necessary part of the library" [3]. In 1972, Strauss, Shreve, and Brown expressed the view that "periodicals constitute a most important part of a science-technology library's resources . . . a body of literature of inestimable significance" [4].

While serials constitute the backbone of the health science library collection, they are also the source of a variety of special problems for the library manager. A major consideration in any library is the problem of selecting journals for acquisition, deciding which titles to continue or to cancel. Identification of important specialty journals is difficult, particularly for librarians of small or intermediate-size collections who wish to maintain a dynamic, general working journal collection augmented by a minimum number of specialty journals in one or more selected areas of subject interest.

The purpose of this study is to illustrate an analytic technique that can be used by any librarian in order to select those specialty journals that are most likely to promote optimum efficiency for the library as an information processing system.

METHODS

In the example presented here, the author examined four medical subject categories within the area of nursing, by exploiting the on-line and offsearch nature of the MEDLARS (Medical Literature Analysis and Retrieval System) data base for *Index Medicus*, the *International Nursing Index*, and the *Index to Dental Literature*. At the time the study was conducted, the data base contained 898,036 citations from approximately 3,000 biomedical journals for the four-year period from January 1972 through December 1975.

JOURNAL SELECTION USING CITATIONS

TABLE 1
SELECTED MEDICAL SUBJECT CATEGORIES

Category I Nursing as a profession (8114 citations)	Category II Nursing care (7517 citations)	Category III Nursing education (4985 citations)
<p>*Nursing (G2.478)</p> <p>Specialties, nursing</p> <p>Geriatric nursing</p> <p>Industrial nursing</p> <p>Midwifery</p> <p>Military nursing</p> <p>Nurse practitioner</p> <p>Obstetrical nursing</p> <p>Operating room nursing</p> <p>Pediatric nursing</p> <p>Psychiatric nursing</p> <p>Public health nursing</p> <p>School nursing</p> <p>Surgical nursing</p> <p>or</p> <p>*Nurses (M1.526.485.635.486)</p> <p>Nurse anesthetist</p> <p>Nurse midwife</p> <p>Nurse practitioners</p> <p>Nurses, male</p>	<p>*Nursing care (E2.472.611)</p> <p>Home nursing</p> <p>or</p> <p>Subheading nursing</p> <p>or</p> <p>Patient care planning</p> <p>or</p> <p>Nursing, team</p> <p>or</p> <p>Nursing audit</p> <p>or</p> <p>Nurse-patient relations</p>	<p>*Education, nursing (I2.358.462)</p> <p>Education, nursing, associate</p> <p>Education, nursing, baccalaureate</p> <p>Education, nursing, continuing</p> <p>Education, nursing, diploma programs</p> <p>Education, nursing, graduate</p> <p>or</p> <p>In-service training AND Special list nursing</p> <p>or</p> <p>Subheading education AND Special list nursing</p> <p>or</p> <p>Students, nursing</p>

*This term was searched using the EXPLODE strategy.

The four broad medical subject categories examined were made up of *MeSH* (*Medical Subject Headings*) headings and subheadings. Table 1 lists the headings used to compose the search strategy. Citations were printed off-line in order to facilitate possible further study and to minimize project costs. For each principal subject category used, a separate journal title card was prepared and each citation to a specific journal was tallied. Cards were then ranked in decreasing order according to the total frequency of citation. This process was repeated for each subject category studied. The citations retrieved were then analyzed quantitatively using methods similar to those of traditional citation analysis.

Verification of citation postings was accomplished by entering each individual journal title code against each subject category. The "OFF-SEARCH" command and "OFFOUTS" key word [5] capability of the MEDLARS system was utilized to print journal postings off-line at the National Library of Medicine's MEDLARS Management Office. These listings were then sent to the investigator.

In selecting the citations to be analyzed, the following procedures were followed:

1. The MEDLARS data base was used; it includes all the "Special List" journals.

2. Citations were taken from a four-year period available through the MEDLARS data base, January 1972 through December 1975.
3. Selected subject headings were searched using the EXPLODE [6] strategy, whereby the MEDLINE analyst automatically applied the "OR" operator to all the terms indented under the general term, as indicated in Table 1, as well as the general term itself.
4. All citations retrieved through searching under the designated subject headings were tabulated by category.
5. No restrictions were made with respect to language of publication or country of origin.
6. Retrieval of postings for each category identified in Figure 1 was determined by the MEDLINE analyst utilizing the Boolean operators of "AND," "OR," and "AND NOT."

ANALYSIS OF THE SAMPLE

One of the primary objectives of this study was to identify the serial titles containing articles indexed under each of the broad nursing subject categories identified in Table 1. A related objective was to determine a common serial title listing in rank order from a composite of the three major

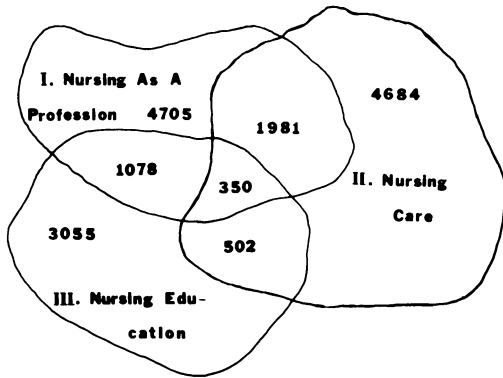


FIG. 1.—Medical subject heading (*MeSH*) category overlap (16,355 unique citations).

subject categories. Tables 2 through 4 show findings obtained by searching the specific *MeSH* terms comprising each category as described and listed in Table 1. Table 5 presents a composite listing of the ninety-four most frequently cited journal titles, which account for approximately 75% of the total of 16,355 unique citations retrieved.

For each title listed in Tables 2 through 5, place of publication is given in parentheses. This information is presented to avoid title confusion as well as to serve as a basis for Table 7, which is a tabulation of national origin of the cited serials. Each table also gives the number of citations retrieved for each title. Titles are given in rank order with most frequently cited titles listed first.

TABLE 2
FREQUENCY OF CITATION TO JOURNALS RETRIEVED THROUGH MEDLARS, 1972-1975,
CATEGORY I: NURSING AS A PROFESSION

Rank	Journal	Citations received		Cumulative percent (8114 citations)
		Number	Percent	
1	Nurs. Times (London)	515	6.347	6.347
2	Nurs. Mirror (London)	324	3.993	10.340
3	Am. J. Nurs. (New York)	287	3.537	13.877
4	Jap. J. Public Health Nurse (Tokyo)	260	3.204	17.081
5	Kango; Jap. J. Nurs. (Tokyo)	187	2.305	19.386
6	Sygeplejersken (Copenhagen)	172	2.120	21.506
7	Nurs. Outlook (New York)	165	2.034	23.540
8	Jap. J. Nurs. [Kangogaku Zasshi] (Tokyo)	164	2.021	25.561
9	Occup. Health Nurs. (New York)	133	1.639	27.200
10	Jap. J. Nurs. Art [Kango Gijutsu] (Tokyo)	119	1.467	28.667
11	NLN Publ. (New York)	119	1.467	30.134
12	Nurs. Clin. North Am. (Philadelphia)	119	1.467	31.601
13	AORN J. (Englewood, Colo.)	114	1.405	33.006
14	Jap. J. Midwife (Tokyo)	112	1.380	34.386
15	Nurs. Res. (New York)	100	1.232	35.618
16	RN (Oradell, N.J.)	98	1.208	36.826
17	Tidskr. Sver. Sjukskoet. (Stockholm)	97	1.195	38.021
18	Dtsch. Krankenpfl. Z. (Stuttgart, Germany)	91	1.122	39.143
19	Australas. Nurses' J. (Melbourne)	88	1.085	40.228
20	Pieleg. Polozna (Warsaw)	87	1.072	41.300
21	Tijdschr. Ziekenverpl. (Amsterdam, Netherlands)	83	1.023	42.323
22	Am. J. Public Health (New York)	82	1.011	43.334
23	Korean Nurse [Taehan Kanho] (Seoul)	82	1.011	44.345
24	Queen's Nurs. J. (London)	80	0.986	45.331
25	Aust. Nurses' J. (Port Adelaide)	78	0.961	46.292
26	J. Psychiatr. Nurs. (Thorofare, N.J.)	75	0.924	47.216
27	Can. Nurse (Ottawa)	74	0.912	48.128
28	Superv. Nurse (Chicago)	73	0.900	49.028
29	N.Z. Nurs. J. (Wellington, N.Z.)	70	0.863	49.891
30	Br. Med. J. (London)	69	0.850	50.741

JOURNAL SELECTION USING CITATIONS

TABLE 3
FREQUENCY OF CITATION TO JOURNALS RETRIEVED THROUGH MEDLARS, 1972-1975,
CATEGORY II: NURSING CARE

Rank	Journal	Citations received		
		Number	Percent	Cumulative percent (6435 citations)
1	Nurs. Times (London)	410	5.454	5.454
2	Am. J. Nurs. (New York)	320	4.257	9.711
3	Jap. J. Nurs. [Kangogaku Zasshi] (Tokyo)	278	3.698	13.409
4	Nurs. Mirror (London)	278	3.698	17.107
5	Jap. J. Nurs. Art [Kango Gijutsu] (Tokyo)	264	3.512	20.619
6	Nurs. Clin. North Am. (Philadelphia)	202	2.687	23.306
7	AORN J. (Englewood, Colo.)	125	1.663	24.969
8	Kango; Jap. J. Nurs. (Tokyo)	117	1.556	26.525
9	Tijdschr. Ziekenverpl. (Amsterdam, Netherlands)	114	1.517	28.042
10	Kango Kyoshitsu (Tokyo)	110	1.463	29.505
11	RN (Oradell, N.J.)	109	1.450	30.955
12	Nurs. Outlook (New York)	99	1.317	32.272
13	J. Pract. Nurs. (New York)	96	1.277	33.549
14	Jap. J. Publ. Health Nurse (Tokyo)	93	1.237	34.786
15	Nursing (Jenkintown)	93	1.237	36.023
16	Nurs. Res. (New York)	91	1.211	37.234
17	Pieleg. Polozna (Warsaw)	84	1.118	38.352
18	Sygeplejersken (Copenhagen)	84	1.118	39.470
19	Dtsch. Krankenpfl. Z. (Stuttgart, Germany)	73	0.971	40.441
20	Hospitals (Chicago)	73	0.971	41.412
21	Jap. J. Nurs. Educ. [Kango Kyoiku] (Tokyo)	72	0.958	42.370
22	Superv. Nurse (Chicago)	72	0.958	43.328
23	NLN Publ. (New York)	69	0.918	44.246
24	Br. Med. J. (London)	67	0.891	45.137
25	Med. Sestra (Moscow)	67	0.891	46.028
26	Nurs. Care (New York)	64	0.852	46.880
27	Z. Krankenpfl. (Bern, Switzerland)	63	0.838	47.718
28	Can. Nurse (Ottawa)	61	0.811	48.529
29	J. Nurs. Adm. (Wakefield, Mass.)	59	0.785	49.314
30	J. Nurs. (Taipei)	58	0.772	50.086

Those titles that share the same rank are listed in alphabetical order by their abbreviations. To the greatest extent possible, all citations to those titles that have had name changes have been consolidated under the most recent name.

Each of Tables 2 through 4 provides an enumeration of those titles that account for slightly over 50% of the citations retrieved. In Table 2, for example, 8,114 citations were retrieved by searching under the exploded *MeSH* terms of NURSING or NURSES. The table shows that approximately 25% of the citations are accounted for by eight titles, and that thirty titles account for slightly over 50% of the citations.

Figure 1 is a Venn diagram showing the overlap of indexing by category. From the figure, one sees

that 8,114 citations were retrieved in Category I, Nursing as a Profession, under the exploded *MeSH* headings NURSING or NURSES, and that 7,517 citations were retrieved in Category II, Nursing Care, by searching under the exploded subject heading NURSING CARE or PATIENT CARE PLANNING or NURSING, TEAM, or NURSING AUDIT or NURSE-PATIENT RELATIONS or the subheading NURSING. A total of 2,331 citations (1,981 + 350) were indexed, using terms common to these two categories. Figure 1 shows that a total of 16,355 unique citations were retrieved for the *MeSH* subject headings and subheadings searched, and that, of these, 350 citations, or slightly over 2%, were indexed simultaneously by terms common to the

TABLE 4
FREQUENCY OF CITATION TO JOURNALS RETRIEVED THROUGH MEDLARS, 1972-1975,
CATEGORY III: NURSING EDUCATION

Rank	Journal	Citations received		
		Number	Percent	Cumulative percent (4985 citations)
1	NLN Publ. (New York)	297	5.958	5.958
2	Jap. J. Nurs. Educ. [Kango Kyoiku] (Tokyo)	266	5.336	11.294
3	Nurs. Times (London)	215	4.313	15.607
4	Nurs. Outlook (New York)	212	4.253	18.860
5	J. Contin. Educ. Nurs. (Thorofare, N.J.)	171	3.430	23.290
6	Nurs. Mirror (London)	125	2.508	25.798
7	Sygeplejersken (Copenhagen)	119	2.387	28.185
8	Tidskr. Sver. Sjukskoet. (Stockholm)	107	2.146	30.331
9	Am. J. Nurs. (New York)	101	2.026	32.357
10	AORN J. (Englewood, Colo.)	97	1.946	34.303
11	Kango Kyoshitsu (Tokyo)	95	1.906	36.209
12	Nurs. Res. (New York)	95	1.906	38.115
13	Kango; Jap. J. Nurs. (Tokyo)	87	1.745	39.860
14	J. Nurs. Educ. (New York)	85	1.705	41.565
15	Dtsch. Krankenpfl. Z. (Stuttgart, Germany)	82	1.645	43.210
16	Pieleg. Polozna (Warsaw)	79	1.585	44.795
17	Tijdschr. Ziekenverpl. (Amsterdam, Netherlands)	78	1.565	46.360
18	Jap. J. Nurs. Art [Kango Gijutsu] (Tokyo)	72	1.444	47.804
19	Nurs. Care (New York)	70	1.404	49.208
20	Sairaanhoitaja Sjukskot. (Helsinki)	66	1.324	50.532

TABLE 5
COMPOSITE LISTING OF FREQUENCY OF CITATION TO JOURNALS RETRIEVED THROUGH MEDLARS, 1972-1975,
EXCLUDING DUPLICATE CITATIONS, UNDER THE MEDICAL SUBJECT CATEGORIES NURSING AS A PROFESSION,
NURSING CARE, OR NURSING EDUCATION

Rank	Journal	Citations received		
		Number	Percent	Cumulative percent (16,355)
1	Nurs. Times (London)	887	5.423	5.423
2	Nurs. Mirror (London)	571	3.491	8.914
3	Am. J. Nurs. (New York)	553	3.381	12.295
4	NLN Publ. (New York)	409	2.501	14.796
5	Jap. J. Nurs. [Kangogaku Zasshi] (Tokyo)	376	2.299	17.095
6	Jap. J. Nurs. Art [Kango Gijutsu] (Tokyo)	359	2.195	19.290
7	Nurs. Outlook (New York)	346	2.116	21.406
8	Kango; Jap. J. Nurs. (Tokyo)	341	2.085	23.491
9	Sygeplejersken (Copenhagen)	311	1.902	25.393
10	Jap. J. Nurses' Educ. [Kango Kyoiku] (Tokyo)	306	1.871	27.264
11	Jap. J. Publ. Health Nurse (Tokyo)	296	1.810	29.074
12	Nurs. Clin. North Am. (Philadelphia)	244	1.492	30.566
13	AORN J. (Englewood, Colo.)	222	1.357	31.923
14	Tijdschr. Ziekenverpl. (Amsterdam, Netherlands)	216	1.321	33.244
15	RN (Oradell, N.J.)	215	1.315	34.559
16	Nurs. Res. (New York)	211	1.290	35.849

JOURNAL SELECTION USING CITATIONS

TABLE 5 (Continued)

Rank	Journal	Citations received		
		Number	Percent	Cumulative percent (16,355)
17	Tidskr. Sver. Sjukskoet. (Stockholm)	209	1.278	37.127
18	Pieleg. Polozna (Warsaw)	207	1.266	38.393
19	Kango Kyoshitsu (Tokyo)	201	1.229	39.622
20	J. Contin. Educ. Nurs. (Thorofare, N.J.)	179	1.094	40.716
21	Dtsch. Krankenpfl. Z. (Stuttgart, Germany)	170	1.039	41.755
22	Superv. Nurse (Chicago)	157	0.960	42.715
23	Sairaanhoitaja Sjukskot. (Helsinki)	148	0.905	43.620
24	Aust. Nurses' J. (Port Adelaide)	140	0.856	44.476
25	Australas. Nurses' J. (Melbourne)	139	0.850	45.326
26	Occup. Health Nurs. (New York)	139	0.850	46.176
27	N.Z. Nurs. J. (Wellington, N.Z.)	138	0.844	47.020
28	Z. Krankenpfl. (Bern, Switzerland)	138	0.844	47.864
29	Jap. J. Midwife (Tokyo)	135	0.825	48.689
30	Can. Nurse (Ottawa)	134	0.819	49.508
31	J. Nurs. Adm. (Wakefield, Mass.)	132	0.807	50.315
32	J. Pract. Nurs. (New York)	132	0.807	51.122
33	Korean Nurse [Taehan Kanho] (Seoul)	131	0.801	51.923
34	Br. Med. J. (London)	128	0.783	52.706
35	Nurs. J. India (New Delhi)	126	0.770	53.476
36	Nursing (Jenkintown, Pa.)	120	0.734	54.201
37	Dist. Nurs. (London)	115	0.703	54.913
38	Krankenpfl. (Frankfurt-Niederrad, Germany)	112	0.685	55.598
39	Hospitals (Chicago)	110	0.673	56.271
40	Am. J. Public Health (New York)	104	0.636	56.907
41	Med. Sestra (Moscow)	104	0.636	57.543
42	Lancet (London)	102	0.624	58.167
43	Infirm. Can. (Ottawa)	98	0.599	58.766
44	J. Nurs. Educ. (New York)	93	0.569	59.335
45	J. Nurs. (Taipei)	92	0.562	59.897
46	Nurs. Care (New York)	92	0.562	60.459
47	J. Psychiatr. Nurs. (Thorofare, N.J.)	91	0.556	61.015
48	S.A. Nurs. J. (Pretoria)	86	0.526	61.541
49	Int. Nurs. Rev. (Geneva)	79	0.483	62.024
50	Zdrav. Prac. (Prague)	78	0.477	62.501
51	Sykepleien (Oslo)	74	0.452	62.953
52	Midwives Chron. (London)	73	0.446	63.399
53	Compr. Nurs. Q. [Sago Kango] (Tokyo)	72	0.440	63.839
54	Jap. J. Nurs. Res. [Kango Kenyuku] (Tokyo)	64	0.391	64.230
55	Med. J. Aust. (Sydney)	64	0.391	64.621
56	JOGN Nurs. (Chicago)	62	0.379	65.000
57	Katilolehti (Helsinki)	62	0.379	65.379
58	World Ir. Nurs. (Dublin)	62	0.379	65.758
59	Rev. Infirm. (Paris)	61	0.373	66.131
60	Laekartidningen (Stockholm)	59	0.361	66.492
61	Int. J. Nurs. Stud. (Oxford)	58	0.355	66.847
62	Hosp. Community Psychiatry (Washington)	56	0.343	67.190
63	Lamp (Sydney)	56	0.343	67.533
64	Munca. Sanit. (Bucharest, Romania)	56	0.343	67.876
65	Health Visit. (London)	55	0.336	68.212
66	Nurs. Pap. (Quebec, Canada)	54	0.330	68.542
67	Perspect. Psychiatr. Care (Hillsdale, N.J.)	51	0.312	68.854
68	J. N.Y. State Nurs. Assoc. (Albany)	50	0.306	69.160

TABLE 5 (Continued)

Rank	Journal	Citations received		
		Number	Percent	Cumulative percent (16,355)
69	Pediatrics (Springfield, Ill.)	48	0.293	69.453
70	Schwest. Rev. (Munich, Germany)	48	0.293	69.746
71	Can. Hosp. (Toronto)	46	0.281	70.027
72	J. School Health (Columbus)	46	0.281	70.308
73	Rev. Bras. Enferm. USP (Sao Paulo, Brazil)	44	0.269	70.577
74	Midwife Health Visit. (London)	43	0.263	70.840
75	ANA Publ. (Kansas City, Mo.)	40	0.245	71.085
76	Niger. Nurse (Lagos, Nigeria)	39	0.239	71.324
77	Can. J. Psychiatric Nurs. (Winnipeg)	38	0.232	71.556
78	J. Neurosurg. Nurs. (Indianapolis)	38	0.232	71.788
79	N.Z. Med. J. (Wellington)	37	0.226	72.014
80	Philipp. J. Nurs. (Manila)	34	0.208	72.222
81	Prof. Inferm. (Rome)	34	0.208	72.430
82	Rev. Esc. Enferm. USP (Sao Paulo, Brazil)	34	0.208	72.638
83	Kenya Nurs. J. (Kenya)	33	0.202	72.840
84	Occup. Health (London)	32	0.196	73.036
85	Fel'dscher. Akush. (Moscow)	32	0.196	73.232
86	Imprint (New York)	31	0.190	73.422
87	Can. J. Public Health (Toronto)	30	0.183	73.605
88	Image (Indianapolis)	29	0.177	73.782
89	ANPHI Pap. (Quezon City, Philippines)	28	0.171	73.953
90	Dimens. Health Serv. (Toronto)	28	0.171	74.124
91	Hosp. Prog. (St. Louis)	28	0.171	74.295
92	Osterr. Schwesternz. (Vienna)	28	0.171	74.466
93	S. Afr. Med. J. (Cape Town)	27	0.165	74.631
94	Cesk. Gynekol. (Prague)	26	0.159	74.790

three defined categories. The figure also identifies the number of citations to groups of articles indexed solely by *MeSH* terms common to a single category; for example, 4,705 citations were retrieved and identified in Category I as having been indexed solely by the exploded terms NURSING or NURSES and not by any of the terms common to the other two categories as defined in Table I.

The data shown in Table 5 and in Figure 2 provide information on the serial title dispersion for nursing literature. Over 25% of the citations are accounted for by nine titles; over 50% of the serial citations are accounted for by thirty-one titles; and seventy-one titles account for slightly over 70% of the citations. From these data one sees that there is a high serial title dispersion in nursing literature and that nursing is not well served by any single publication.

Figure 2 is a graphic presentation of the data presented in Table 5, and shows the number of titles required to obtain any given percentage of

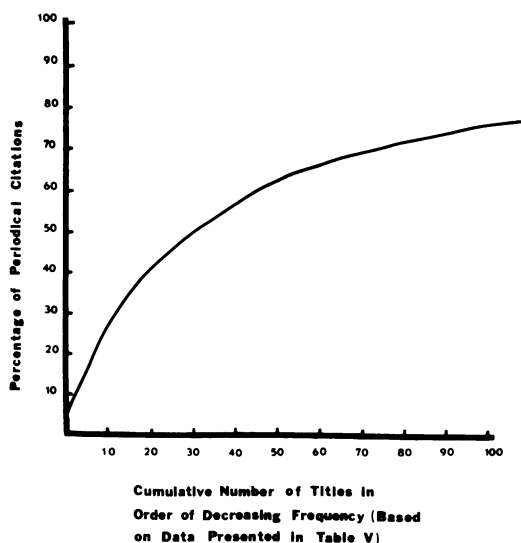


FIG. 2.—Number of serial titles required to obtain various percentages of citations.

JOURNAL SELECTION USING CITATIONS

TABLE 6
NUMBER OF JOURNAL TITLES REQUIRED TO COVER VARIOUS PERCENTAGES OF
THE LITERATURE OF DIFFERENT MEDICAL SUBJECT CATEGORIES

Category	Total number (1972-1975)	Approximate number of journal titles required to cover various per- centages of the literature					
		15%	25%	50%	75%	90%	100%
I. Nursing as a profession	8,114	4	8	30	76	194	519
II. Nursing care	7,517	4	7	30	72	174	521
III. Nursing education	4,985	3	6	20	58	131	378
Categories I, II, and III above, excluding duplicate citations	16,355	4	9	31	95	212	691

citations from 0% to 75%. Periodical titles are plotted cumulatively on the abscissa and the percentage of citations along the ordinate. The curve is seen to be J-shaped and highly skewed, with a long upper tail. A distribution with a curve of this description has come to be called a Yule Distribution [7], and nursing literature is seen to conform to the Yule pattern.

Table 6 shows the approximate number of journal titles required to cover various percentages of the citations retrieved. The table shows that a total of 8,114 citations, retrieved by searching the exploded *MeSH* terms NURSING or NURSES, span 519 serial titles. In the composite of the *MeSH* subject headings and sub-headings searched, a total of 16,355 unique citations were found to span 691 serial titles. An analysis of the country of origin of these serial titles, presented in Table 7, shows that the serials are published in fifty different countries. Information concerning the country of origin for each serial title was found in the 1975 *List of Journals Indexed in Index Medicus* or in the 1975-1976 *Ulrich's International Periodicals Directory*, sixteenth edition.

Table 7 shows that titles published in the United States account for 48.63% of the titles cited and that British publications account for 11.29% of the titles, the combined percentage being 59.92%. Titles from West Germany, Canada, France, Switzerland, Russia, and Japan account for 4.63, 3.47, 3.04, 2.46, 2.31, and 1.88%, respectively, or 17.79% of the total. The combined totals from all these countries are 77.71%. Although Japan contributes 13 of the 691 serial titles, or 1.88%, articles cited in these publications represent 2,225 citations, or 13.60% of the total number of 16,355

citations retrieved. An examination of Table 5 shows that 9 Japanese publications are among the top-ranking 94 serials listed, accounting for 2,150 citations, or 17.58% of the 12,232 citations shown in this table.

IMPLICATIONS FOR THE LIBRARY

There are a number of techniques and approaches used by library administrators for the development of their serials collections. The analysis of citations as a technique in order to describe, organize, and control literature has been applied with notable regularity for more than four decades, since first being described in 1927 by Gross and Gross [8]. The technique used in this investigation is a variation of traditional citation

TABLE 7
NURSING LITERATURE: SERIAL TITLES BY
COUNTRY OF ORIGIN

Country	Number of titles	Percent of titles
United States	336	48.63
England	78	11.29
West Germany	32	4.63
Canada	24	3.47
France	21	3.04
Switzerland	17	2.46
USSR	16	2.31
Japan	13	1.88
Australia	11	1.59
Belgium	11	1.59
Czechoslovakia	10	1.45
Poland	8	1.16
38 other countries	114	16.50
Total	691	100.00

analysis in that the citations analyzed are those that have been assigned subject headings by the indexers who prepare the data base for the three major medical indexes: *Index Medicus*, the *International Nursing Index*, and the *Index to Dental Literature*. The MEDLARS data base was chosen because of its accessibility and wide use in biomedical, health science, and nursing libraries. Maximum coverage of nursing literature was insured by accessing the total pool of citations of the medical indexes mentioned above through use of MEDLARS, which includes the "Special List" journals. The citations have been retrieved, exploiting the on-line nature of MEDLINE, by using *MeSH* headings and subheadings.

The medical subject categories selected for use in this study were chosen to reflect a broad representation of nursing [9]. Category I treats nursing as a profession and includes, among others, citations to articles dealing with topics such as definitions of nursing, trends in nursing, theory of nursing, and purpose, objective, image, and developing role of the nurse. Category II considers nursing care from the patient's point of view and includes citations to articles dealing with standards and evaluation of nursing techniques, relationships between the nurse and the patient or the nurse and the physician, working relationships between departments in the hospital from the nurse's point of view, and similar subjects. Category III is nursing education. This category considers nursing as an intellectual process and includes citations to articles dealing with topics such as the philosophy of education as applied to nursing, revising or evaluating the nursing curriculum, and grades versus nongrades for nursing courses, among others.

When performing a MEDLARS search using a strategy such as that shown in Table 1, the investigator and MEDLINE analyst must be mindful of the indexing procedures followed by the National Library of Medicine for journal titles cited in the *International Nursing Index* but not in *Index Medicus*. If one does not take into account the idiosyncrasies of a particular system, certain data may unknowingly be excluded, resulting in an incomplete data pool [10].

A principal consideration in selecting the four-year period was to equalize any possible variation or short-term trends that may be present in nursing literature. Another consideration in selecting the four-year period was to stabilize the probable changes that are expected to occur from year to year in the journal rankings.

In retrieving citations, no restrictions were

made as to the language of publication or the country of origin. The non-English-language titles were included in the rank order listings in order to present a picture of the role of foreign language materials in nursing literature as well as to make the findings more useful to librarians in centers that have the resources and interest in non-English-language titles. The librarian of the small to intermediate-size library may use the rank order listing by selecting those domestic and foreign journals, published in English as well as in other languages, that they find appropriate for their collection and clientele.

The technique described here has many advantages that may enable the librarian to improve the usefulness of the library collection. The purpose of this approach is to anticipate and to predict collection demand with efficiency and economy, but this technique is not without certain limitations. Application of the technique identifies a distribution of journal literature on the basis of the quantity of citations found to refer to an individual journal title. The technique does not assess quality, utility, or the informational value of individual journal articles, or serials, nor does it purport to classify individual articles or serials on this basis. Thus its use is independent of the question of whether citations drawn from an abstracting and indexing service journal have the same relative usefulness as citations drawn from primary journal sources. Similarly, use of the technique is independent of the question of whether citations, retrieved from any source and analyzed under any circumstance, can be used as predictors for future journal use. It should also be understood by the reader that the data base from which the data for this study have been drawn is directly dependent both on indexing priorities assigned to journals by the indexing service and on the frequency with which the individual journals are published. Thus there is a bias in favor of those journals that are published more frequently and that contain the greatest number of articles.

Despite the limitations of the technique described, at the Duluth Campus University of Minnesota Health Science Library we have found it to be highly usable and have regularly applied it in developing various areas of our serials collection. Over the past four years, application of this and other collection development techniques has enabled us to develop and concentrate our limited financial resources in acquiring key materials necessary to meet the needs of our clientele. A comparison of interlibrary loan activity of materials that we borrowed from or lent to other in-

stitutions tends to support the basic premise of the particular approach and technique described in this paper. We are now in the process of devising methods to evaluate critically and to measure the general effectiveness and overall validity of the technique.

Acceptance of the lists produced by use of this or any other research technique must be made with an appreciation of the technique's limitations and in the light of the library environment in which the findings may be applied. In any question of collection development, the librarian must consider criteria that transcend the data from which any investigative results have been derived. The most important criteria are those such as the library's collection emphasis and subject depth, the scholarly level and language competence of its clientele, and local needs and variations, as well as practical considerations such as budgetary resources, physical space, and personnel.

CONCLUSION

The technique of analyzing journal citations retrieved from an abstracting or indexing service is useful to the administrator of a small or intermediate-size library that is not in a position to develop or maintain an exhaustive or inclusive collection in a particular field or discipline. The technique is easily applied and offers the librarian an opportunity to perform an analysis of the journal literature in areas specific to the library's interest. The result of the technique is an identification of specialty journals that can be rank-ordered into zones of decreasing frequency of productivity—productivity in terms of the quantity, though not necessarily the quality, of content of papers published. This ranking can be used to concentrate library resources to satisfy a predetermined percentage of the total periodical literature needs of the library's clientele in a particular field or subject area. The technique employed in this study may be useful in establishing a

library policy for determining questions of periodical purchase or subscription selection, as well as priorities involved in binding and microform purchases. The data can also be significant for consortium development and network activity. The purpose of the approach described is to anticipate and to predict collection demand with efficiency and economy.

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